

IEA AFIS Fuels Update

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Quarterly newsletter on automotive fuels for the members
of the Implementing Agreement on Alternative Motor
Fuels of the IEA (IEA AMF)

Colophon

Fuels Update is a quarterly newsletter released under the authority of the Implementing Agreement of the Alternative Motor Fuels Agreement of the International Energy Agency. Fuels Update, issued by IEA/AFIS, gives short summaries on recently published articles, reports and books in the field of (alternative) motor fuels, without giving any rating to the information presented.

For your comments, suggestions or when you have news items that you wish to get known among the IEA/AMF members, please contact:

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(for the attention of
Annemarie van Malsen).*

The newsletter is distributed by the delegates of the participating countries of the IA on AMF, who are listed on page 4.

Introduction

This is the first issue of the Newsletter for the Implementing Agreement on Alternative Motor Fuels (AMF) of the International Energy Agency (IEA) published by Innas.

The IEA Automotive Fuels Information Service (IEA/AFIS), run by Innas/Netherlands and Atrax/Sweden, monitors the enormous flow of information on conventional and alternative motor fuels. IEA/AFIS organises, assesses, interprets and processes this information. Information is not simply copied, but evaluated and interpreted. In this way IEA/AFIS can supply a sound and up-to-date overview at any time for any given part of the field. They have published the Automotive Fuels Survey, a comprehensive and systematic overview of almost all motor fuels.

The objective of this Newsletter is to give information on recently published, interesting articles, reports and books in the field of (alternative) motor fuels. IEA/AFIS is in a good position to publish this. Contrary to the surveys, this newsletter will only contain short descriptions and the source of the information. Any questions on these references or on other alternative motor fuels issues can be answered; however, not for free.

Primarily, the target group is the group of persons involved in the work of the AMF, as member of the Executive Committee or as Operating Agent. Furthermore, it is available for distribution by the persons mentioned above to anybody who is interested in the subject, be it governmental policy makers, colleagues in the organisation or other interested persons.

The first three issues will be published in 1998 and are paid by the Common Fund of the IEA/AMF. After that year it will be evaluated. Do not hesitate to send us your comments and suggestions.

We do hope that the Newsletter will prove to be an easy, accessible and comprehensive guide to information on alternative motor fuels.

Ben van Spanje,
Chairman of IEA's Alternative Motor Fuels committee.

Diesel

Diesel/ Water blends

Oil companies have investigated the possibilities of diesel-water emulsion for use in vehicles, with different outcomes. Deutsche Shell AG for instance does not see possibilities for a diesel/water blend at this time. In a Positions Statement of July 30, 1997, Shell states that many problems still need to be overcome, such as production cost, stability of the emulsion, higher CO₂ emissions, the decreased driving range and the need for a dedicated engine.

French State Oil Company Elf is more optimistic about the problems related to diesel/water blends. At the end of 1998, Elf Aquitaine plans the market introduction of Aquazole, a stable diesel-water emulsion. The oil company aims for heavy duty appliances, such as buses, trucks, trains and electricity production. Aquazole has been used in 3 buses in Chambéry which together drove over 250,000 km without problems.

Sources:

- Elf France, <http://www.elf.fr/doss/aqua/souchx.htm>.
- Deutsche Shell AG. Positions Statement - Kraftstoff/Wasser-Emulsionen - ein Treibstoff für die Zukunft?

Synthetic diesel emissions

Transient emissions test were performed to compare regular US diesel fuel with synthetic diesel produced by the new Sasol Slurry Phase Distillate Process (SSPD). In this process natural gas is converted into

diesel, kerosene and naphtha.

Fuels tested were: two variations of the SSPD fuel, 2-D grade diesel fuel, a reformulated diesel fuel meeting the CARB specifications and three blends of 2-D diesel with various concentrations of SSPD fuel. Diesel fuels produced by the SSPD method were found to produce significantly lower emissions of HC, NO_x, CO and PM than the 2-D and CARB fuels. The blended fuels also produce lower emissions.

More information: *Diesel Exhaust Emissions Using Sasol Slurry Phase Distillate Process Fuels. Technical paper 972898 for SAE, Warrendale, USA by Sasol Oil, Sastech Research & Development and Southwest Research Institute.*

Natural gas

BMW natural gas engine

Optimised natural gas engines can meet EZEZ standards, claims car manufacturer BMW. In 1995, BMW introduced two passenger cars both suited for natural gas and gasoline. When operated on natural gas these vehicles could meet the ULEV limits. Moreover, the exhaust gas emission when running on natural gas were about to meet with the limiting values of the Equivalent Zero Emission Vehicles (EZEZ) of the California Air Resources Board.

An engine for exclusive natural gas operation was designed after analysing possible engine improvements such as in fuel economy, emissions, full load and maximum exhaust gas temperatures. Vehicle examinations in FTP75 tests confirm the existing

potential for meeting the EZEZ standards. According to BMW, natural gas engines could become an acknowledged alternative to the electric vehicles. Provided, however, that the EZEZ specifications that are now under discussion will be put into effect.

Source: MTZ (*Motortechnische Zeitschrift*, September 1997). More information: BMW, Mr. Edgar Heck, tel +49 (89)382 33498 or fax +49 (89)382 25858.

LPG and natural gas city vehicles

It is both technically and practically possible to use natural gas or LPG in heavy duty (HD) city vehicles such as city busses and garbage trucks. This is one of the outcomes from the international workshop "New energy-saving and environmentally friendly technology for busses and trucks", which was held on April 29, 1998 in Brussels. Using these gaseous fuels can reduce the vehicle's exhaust emissions, noise production and vibrations. However, the cost of gas vehicles is significantly higher than the cost of HD diesel vehicles. At this moment, manufacturers of HD vehicles see sufficient potential for diesel engines (e.g. a further reduction of emissions).

Source: *proceedings workshop "New energy-saving and environmentally friendly technology for busses and trucks"*, available from VITO, Mol, Belgium. tel: +32 (14) 335 815 fax: +32(14) 321 185

Biodiesel

Waste cooking oil

A UK study describes a fuels comparison test of a standard pump diesel, RME biodiesel and Waste Cooking Oil Methyl Esther (WCO-ME) biodiesel. This study was carried out for County Durham at the Limerick University. Power levels of WCO-ME Biodiesel were on average 5 % lower than fossil diesel. The emissions levels of WCO-ME are very similar to RME, the exhaust of smoke is about 30% less compared with regular diesel.

Source: *Study into the use of recycled oils for blending with rapeseed oil to produce biodiesel.* Maurice Raine, instrumentation engineer, tel/fax +44 (1388) 718 924.

Nitrogen

Zero emission vehicle

Researchers at the University of Washington are developing a new zero-emission vehicle that is running on liquid nitrogen. They claim to have built an alternative that has a larger action radius than an electric vehicle and is also safer than gas or electric cars. A 1984 mail delivery van was converted into an operating proof-of-concept test vehicle. The principle of operation is like that of a steam engine, with the difference that no combustion is involved. Instead, liquid nitrogen at -196 °C (-320 °F) is pressurised and is vaporised in a heat exchanger by the ambient temperature of the surrounding air. This heat exchanger can be compared with the radiator in a car,

instead of using air to cool water, however, it uses air to heat and boil liquid nitrogen. The resulting high-pressure nitrogen gas is fed to an engine that operates like a reciprocating steam engine, converting pressure to mechanical power. The only exhaust the vehicle produces is nitrogen.

Source: *University of Washington.* A. Hertzberg, tel.: +1 (206) 543-6321, e-mail: plueagle@aol.com or C. Knowlen tel.: +1 (206) 543-7159, e-mail: knowlen@aa.washington.edu. Internet page: <http://www.aa.washington.edu/AERP/Crycoar>.

Alcohol Fuels

Ethanol test plant

The IEA Biotechnology network is concerned with the technoeconomic issues which are restricting the commercialisation of biomass-to-ethanol. One of the topics in their newsletter of January 1998 is the agreement signed by Petro-Canada and Iogen Corporation to jointly invest in the construction of a \$15-30 million ethanol test plant at Iogen's site in Ottawa, to demonstrate the commercial feasibility of the technology. The companies believe that the process, which uses bioengineered enzymes to convert low cost cellulose (straw, wood wastes and grasses) into ethanol could give them a commanding lead in the race to replace fossil fuels in Canada's transportation sector.

For information on the project: *Petro-Canada News Releases at* <http://www.petro-canada.ca>
Task leader of IEA Biotechnology network: Prof. J.N. Saddler, University of British Columbia, Faculty of Forestry.

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Miscellanea

Particulate matter

In their brochure *VTT Energy 1998 Highlights*, VTT Energy states it is targeting towards more extensive analysis of particulate matter. This task does not only cover diesel engines, but also S.I. engines, which emit less particulate matter (pm) in mass, but produce very fine particulate matter (below 2.5 µm). The adverse health effect of this fine pm is right now the subject of very lively debate.

Source: *VTT Energy 1998 Highlights. Information N-O.* Nylund. Phone: +358-(9) 4561, fax: +358(9)460 493, e-mail: nils-olof.nylund@vtt.fi

UK clean air strategy

The UK National Air Quality Strategy sets air quality objectives for the year 2005. In *Cleaner Air: the Role for Cleaner Fuels* the potentials for cleaner fuels to improve air quality are outlined. This review was commissioned by the British National Society for Clean Air and Environmental Protection (NSCA). One of the main findings of the report is that the use of cleaner grades of petrol and diesel, CNG and LPG could make a small but significant contribution to improving air quality in the UK. The review also indicates opportunities of action to encourage the use of cleaner fuels, for national and local authorities, as well as for fuel suppliers, motor manufacturers,

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motoring organisations,
fleet operators and
consumers.

*"Cleaner Air: the Role for
Cleaner Fuels" is available from
NSCA, Brighton, UK.
tel +44 (1273) 326 313,
fax +44 (1273) 735 802 or
e-mail info@nsca.org.uk.*

MIT builds plasmatron for use in cars

Plasmatrons are used to
convert hydrocarbons into
an ionised gas (a plasma).
This results in a hydrogen
rich mixture that can be
added to automotive fuels
for combustion in a vehicle
engine. Using this fuel
mixture leads to a cleaner
and more efficient
combustion.

Up till now, plasmatrons
are utilised to produce
hydrogen-rich gases needed
for industrial use. These
plasmatrons have the size
of a car and use large
amounts of electricity.
Researchers at MIT's
Science and Fusion Center,
Cambridge, USA, claim to
have built a compact
plasmatron with a low
energy consumption which
fits in a car easily. MIT's
new plasmatron operates on
1 kW and can convert 90
percent of a fuel into a
hydrogen rich mixture.
When 25 to 50 percent of a
fuel is converted to a
hydrogen rich gas, nitrogen
oxides emissions can be
reduced with a factor of 5 to
10. Tests have been
performed with several
motor fuels, such as regular
gasoline and diesel oil as
well as canola oil, corn oil,
natural gas, methanol and
ethanol.

Source: *Technisch Weekblad*.
More Information: Daniel Cohn,
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Shell scenario car use

In 2020, between 3 to 8
percent of the total amount
of cars are expected to run on
alternative automotive
fuels. This is the expecta-
tion of Deutsche Shell AG
in their report:

"Motorisierung - Frauen
geben Gas". In this report
two different scenarios for
mobility and car use in
Germany towards the year
2020 are described. The first
scenario is based on a
growing appeal for indivi-
dual transportation, in
which the number of cars
per inhabitant will in-
crease, with almost 20
percent in the year 2020. A
second scenario describes a
more moderate growth with
a more important role for
other forms of transporta-
tion. Here a growth of
almost 10 percent is ex-
pected.

As men have already
reached a high level of
motorisation, women are
expected to be a growth
market when it comes to the
use of cars in the future.
Despite the increasing num-
ber of cars, Shell expects
that the fuel consumption in
Germany in 2020 will
decrease with 30 to 40
percent respectively as a
result of car optimisations.

Source: "Motorisierung -
Frauen geben Gas". Deutsche
Shell Aktiengesellschaft.
Fax: +49 (40) 63 24-56 52.
Internet: <http://www.deutsche-shell.de>

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